

Plenary Session

POWER ELECTRONIC CAPACITORS: AN EMERGING TECHNOLOGY?



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BIOGRAPHY

Prof Charles Joubert is a full Professor at Lyon 1 university in Electrical Engineering and a member of the Electrical Department of AMPERE Lab. He received a PhD degree in electrical engineering in 1996 from “Ecole Centrale de Lyon” (Ecully, France). His research area includes power electronics and passive components. He is particularly involved in electromagnetic models of capacitors, passive integrated components and high frequency power converters.

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ABSTRACT

Capacitors are very old electrical components that can be traced back to the Leiden jar in the 18th century.

In view of the many developments that have been made to capacitors, especially in the field of dielectrics, one might mistakenly conclude that there is no further need for improvement of the structure or the immediate environment.

Nevertheless, the characteristics of power electronic capacitors can be improved in several ways. Adjusting their geometry can facilitate heat exchanges and also reduce stray inductances. Even better, specific types of connections can transform a simple capacitor into an extremely effective filter against electromagnetic disturbances. The electromagnetic couplings of the capacitors with their immediate environment can also be improved, thus reducing some of the losses and improving the overall performance of the EMC filters.

Furthermore, the condition of the capacitors can be monitored by attaching sensors to the components which transmit the relevant data (temperature, impedance) and/or analyse them.

Keywords: **capacitors, passive components, power electronics, electromagnetic compatibility (EMC), power integration, reliability**